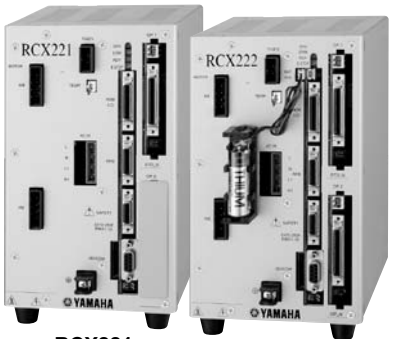
1 to 2 axis

RCX221/RCX222

Robot controller with advanced functions

A 2-axis robot controller with a full range of advanced functions in a compact, space-saving size!
Very easy to use.



RCX221 RCX222

Main functions ▶ P.52

Features

1 Compact

Lightweight and compact design with main unit weight of 2.8kg and height of 210mm.

2 Same price as predecessor “DRCX”

Delivers high-performance along with sophisticated functions yet is the same price as the prior DRCX.

3 The absolute position data hold time: 1 year

The current position information is monitored even during a long vacation, while the controller is kept unused and while it is transported so that the return to the origin process is not required when the controller is activated again. (RCX222 / RCX222HP)

4 Simultaneous control of PHASER and FLIP-X

Offers mixed control of linear motor single-axis robot PHASER series, along with 200 VAC motor single-axis robot FLIP-X series. (RCX221/RCX221HP)

5 Anti-collision control function

Internal function in controller acts to prevent carriage collisions when using double carriages.

6 Applicable to various peripheral equipments

Freely select I/O boards as needed.
Supports parallel I/O (NPN/PNP), CC-Link, DeviceNet™, PROFIBUS, and Ethernet.

7 Capable of using additional function of “YC-Link” for additional axis

Linking the RCX series controller with the SR1 series single-axis controller allows controlling a maximum of 8 axes (synchronous control of 6 axes).

Model Overview

Name	RCX221 / RCX221HP	RCX222 / RCX222HP
Power	Single phase: AC200V to 230V +/-10% maximum (50/60Hz)	
Operating method	Programming / Remote command / Operation using RS-232C communication	
Maximum number of controllable axes	2 axes maximum	
Position detection method	Incremental / Semi-absolute	Absolute / Incremental
Controllable robot	Cartesian robot XY-X / Single-axis robot FLIP-X / Linear motor single-axis robot PHASER/ Pick & place robot YP-X	Cartesian robot XY-X / Single-axis robot FLIP-X / Pick & place robot YP-X
Programming box	RPB / RPB-E (with enable switch) P.491	
Support software for PC	VIP+ P.489 / VIP	

Ordering method

RCX221 / RCX221HP

RCX221 – [ ] – [ ] – [ ] – [ ]

Controller Note 1	Usable for CE	Regenerative unit Note 2	Input/Output Selection 1	Input/Output Selection 2
RCX221	No entry: Standard	No entry: None	N: NPN	No entry: None
RCX221HP	E: CE marking	R: RG2	P: PNP	N1: OP.DIO24/16 (NPN)
			CC: CC-Link	P1: OP.DIO24/16 (PNP)
			DN: DeviceNet™	EN: Ethernet Note4
			PB: PROFIBUS	
			EN: Ethernet	
			YC: YC-Link Note3	

Note 1. Driver selection and regenerative unit selection depends on the robot type. See Specification selection table on following page.
Note 2. The regenerative unit (option) is required when operating a model designated by YAMAHA or a load with a large inertia.
Note 3. Available only for the master.
Note 4. Only when you have selected CC, DN or PB for Input/Output selection 1, you can select EN for Input/Output selection 2.

RCX222 / RCX222HP

RCX222 – [ ] – [ ] – [ ] – [ ]

Controller Note1	Usable for CE	Regenerative unit Note2	Input/Output Selection 1	Input/Output Selection 2
RCX222	No entry: Standard	No entry: None	N: NPN	No entry: None
RCX222HP	E: CE marking	R: RG2	P: PNP	N1: OP.DIO24/16 (NPN)
			CC: CC-Link	P1: OP.DIO24/17 (PNP)
			DN: DeviceNet™	EN: Ethernet Note4
			PB: PROFIBUS	
			EN: Ethernet	
			YC: YC-Link Note3	

Note 1. Driver selection and regenerative unit selection depends on the robot type. See Specification selection table on following page.
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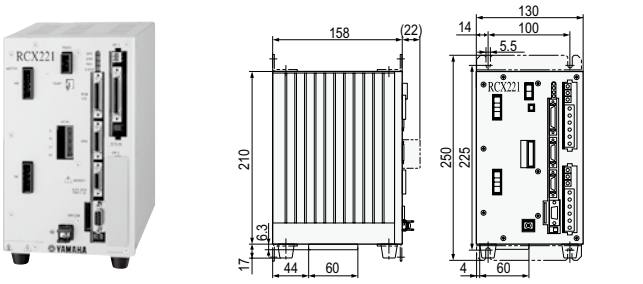
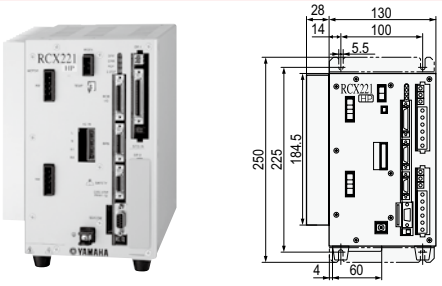
Part names / dimensions

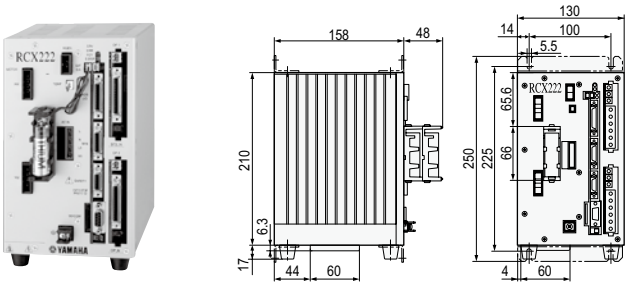
RCX221 Dimensions



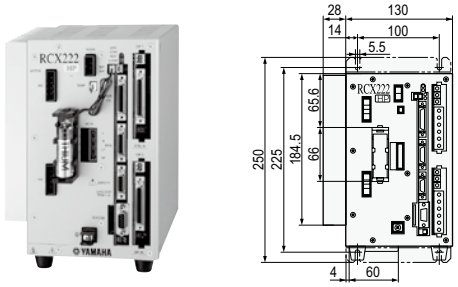
RCX221HP Dimensions



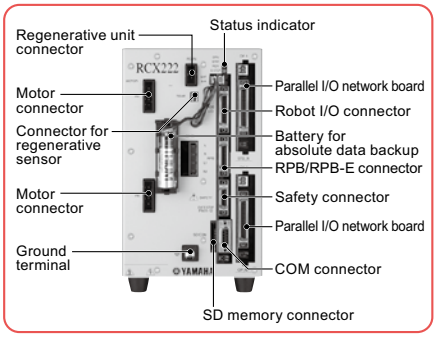
RCX222 Dimensions



RCX222HP Dimensions



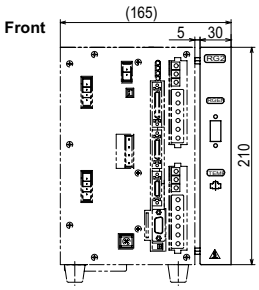
Part names



Note. Photograph shows RCX222. The component names on the RCX221 are the same but it does not come with an absolute backup battery.

Regenerative unit RG2

Regenerative unit RG2



Note. Depth (D) is 158mm.
Installs on the right side of the RCX221 (HP), RCX222 (HP). Cannot be installed as a separate unit.

Basic specifications

Item	RG2
Model	KAS-M4130-00 (including cable supplied with unit)
Dimensions	W35 × H210 × D158mm
Weight	0.8kg
Regenerative voltage	Approx. 420V or more
Regenerative stop voltage	Approx. 380V or less
Accessory	Cable for connection with controller (300mm)

Note. Installs on the right side of the RCX221 (HP), RCX222 (HP). Cannot be installed as a separate unit.

Specification selection table

The robot type automatically determines the normal specifications or HP specifications.

RCX221 / RCX221HP

		PHASER						
		MR12D	MF7D	MF15D	MF20D	MF30D	MF50D	MF75D
RCX221		●	●	●	●			
RCX221HP						●	●	●
Regenerative unit	No entry (None)	●	●	●				
	R (RG2)				●	●	●	●

● : Applicable

RCX222 / RCX222HP

		FLIP-X		XY-X													YP-X		Clean
				Arm type, Gantry type, Moving arm type, Pole type							XZ type								
		N15D	N18D	PXYx	FXYx	FXYBx	SXYx	SXYBx	NXY	MXYx	HXYx	HXYLx	SXYx (ZF)	SXYx (ZFL20)	SXYBx (ZF)	SXYBx (ZFL20)	MXYx	HXYx	YP220BX	YP320X	SXYxC
				2 axes																	2 axes
RCX222				●	●	●	●	●	●	●			●	●	●	●	●	●	●	●	●
RCX222HP		●	●								●	●									
Regenerative unit	No entry (None)			●	●	●	●	○					●		●						●
	R (RG2)	●	●					○	●	●	●	●		●		●	●	●			

● : Applicable ○ : Select per conditions

Power capacity

Required power supply capacity varies according to the robot type and number of axes. Prepare a power supply using the following table as a general guide.

When connected to 2 axes (Cartesian robot or multi-axis robot)

Axial current sensor value		Power capacity (VA)
X axis	Y axis	
05	05	500
10	05	700
10	10	900
20	05	1500
20	10	1700
20	20	2000
		2400 (HP)

Note. Even if axial current sensor values for each axis are interchanged no problem will occur.

Motor capacity vs. current sensor table

Connected motor capacity	Current sensor
100W or less	05
200W	10
400W or more	20

Note. Motor output of the B14H is 200W but the current sensor is 05.

Conditions where regenerative unit is needed on multi robots

- Motor capacity exceeds a total of 450W.
- Motor capacity for perpendicular axis exceeds a total of 240W.
- The following conditions apply when perpendicular axis capacity is 240W or less.
  - perpendicular axis is 200W.
  - perpendicular axis is 100W and stroke is 700mm or more.
  - there are 2 perpendicular axes at 100W, and includes leads of 5mm.
- B14H which maximum speed exceeds 1250mm per second.

RCX221/RCX222

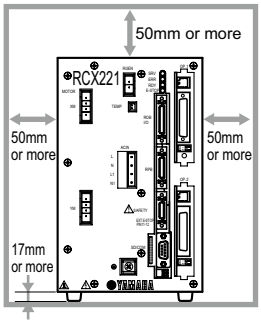
Basic specifications

	Item		Model	RCX221	RCX221HP	RCX222	RCX222HP
Basic specifications	Number of controllable axes			2 axes maximum			
	Controllable robots			Single-axis robot FLIP-X, Linear motor single-axis robot PHASER, Cartesian robot XY-X, Pick & place robot YP-X		Single-axis robot FLIP-X, Cartesian robot XY-X, Pick & place robot YP-X	
	Connected motor capacity			2 axes total: 800W or less	2 axes total: 900W to 1200W	2 axes total: 800W or less	2 axes total: 900W to 1200W
	Maximum power consumption			1700VA	2400VA	1700VA	2400VA
	Dimensions			W130 × H210 × D158mm			
	Weight			Approx. 2.9kg	Approx. 3.1kg	Approx. 2.9kg	Approx. 3.1kg
	Input power supply	Control power supply		Single phase AC200 to 230V +/-10% maximum (50/60Hz)			
		Motor power		Single phase AC200 to 230V +/-10% maximum (50/60Hz)			
Axis control	Drive method			AC full-digital software servo			
	Position detection method			Resolver, Magnetic linear scale		Multi-turn resolver with data backup function	
	Operating method			PTP (Point to Point), Linear interpolation, Circular interpolation, Arch motion			
	Coordinate system			Joint coordinates, Cartesian coordinates			
	Position indication units			Pulses, mm (millimeters), deg (degrees)			
	Speed setting			1% to 100% (In units of 1%. However speed is in units of 0.01% during single-axis operation by DRIVE statement.)			
	Acceleration setting			1.Automatic acceleration setting based on robot model type and end mass parameter 2.Setting based on acceleration and deceleration parameter (Setting by 1% unit)			
	Resolution			1μm		16384 P/rev	
	Origin search method			Incremental / Semi-absolute		Absolute / Incremental	
Program	Program language			YAMAHA BASIC (Conforming to JIS B8439 SLIM Language)			
	Multitasks			8 tasks maximum			
	Sequence program			1 program			
	Point-data input method			Manual data input (coordinate value input), Direct teaching, Teaching playback			
Memory	Memory capacity			364KB (total capacity of program and points) (available program capacity during use of maximum number of points is 84KB)			
	Programs			100 program 9,999: maximum lines per program 98KB: maximum capacity per program			
	Points			10,000 points : maximum numbers of points			
	Memory Backup battery			Lithium metallic battery (service life 4 years at 0℃ to 40℃)			
	Internal flash memory			512KB (ALL data only)			
External input/output	STD.DIO	I/O input		Dedicated input 10 points, General input 16 points			
		I/O output		Dedicated Output12 points, General output 8 points			
	SAFETY			Emergency stop input (Relay contact), Service mode input (NPN/PNP specification is set according to STD. DIO setting)			
	Brake output			Relay contact			
	Origin sensor input			Connectable to DC 24V normally-closed contact sensor			
	External communications			RS232C: 1CH D-SUB9 (female) RS422 : 1CH (RPB)			
	Options	Slots		2 (inc.STD.DIO)			
		Type		STD.DIO (NPN/PNP): Dedicated input 10 points / General input 16 points, Dedicated Output 12 points / General output 8 points			
				Optional input/output (NPN/PNP): General input 24 points / General output 16 points			
				CC-Link: Dedicated input 16 points, Dedicated Output 16 points, General input 96 points, General output 96 points (4 nodes occupied)			
				DeviceNet™: Dedicated input 16 points, Dedicated Output 16 points, General input 96 points, General output 96 points			
				PROFIBUS: Dedicated input 16 points, Dedicated Output16 points, General input 96 points, General output 96 points			
				Ethernet: IEEE802.3 10Mbps (10BASE-T)			
Options	Programming box			RPB, RPB-E (with enable switch)			
	Support software for PC			VIP+ / VIP			
General specifications	Operating temperature			0°C to 40°C			
	Storage temperature			-10°C to 65°C			
	Operating humidity			35% to 85%RH (non-condensing)			
	Absolute backup battery			–		Lithium metallic battery 3.6V 5400mAH (2700nAH × 2)	
	Absolute data backup period			–		1 year (in state with no power applied)	
	Noise immunity			IEC61000-4-4 Level3			
	Protecting structure			IP10			

Installation conditions

- Install the RCX221/RCX222 inside the control panel.
- Install the RCX221/RCX222 on a flat, level surface.
- Install the RCX221/RCX222 in a well ventilated location, with space on all sides of the RCX221/RCX222 (See fig. at right.).
- Do not block the heat-sink on the side panel.
- Do not block the fan on the bottom of the controller.
- Ambient temperature : 0 to 40˚C
- Ambient humidity : 35 to 85% RH (no condensation)

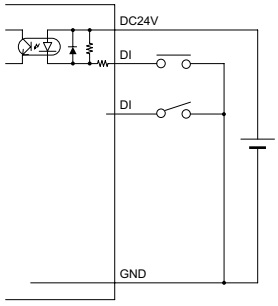
● RCX221



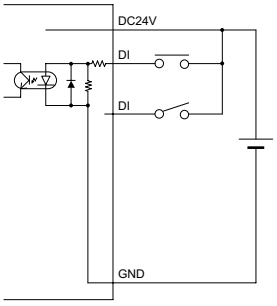
*Provide the same space dimensions for RCX222.

Example of input signal connection

●NPN specification

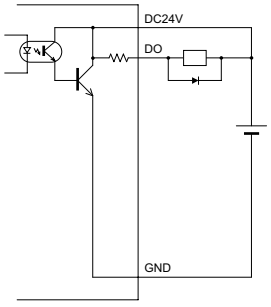


●PNP specification

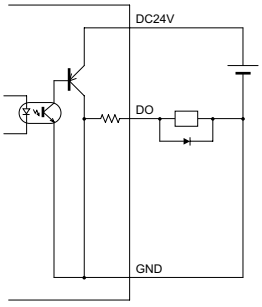


Example of output signal connection

●NPN specification

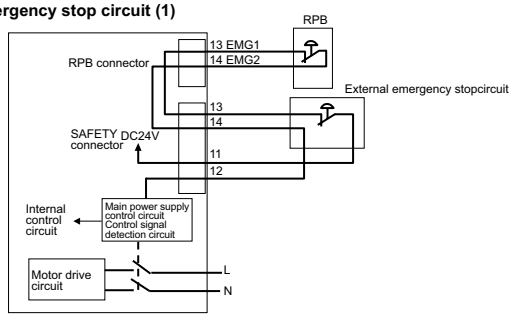


●PNP specification

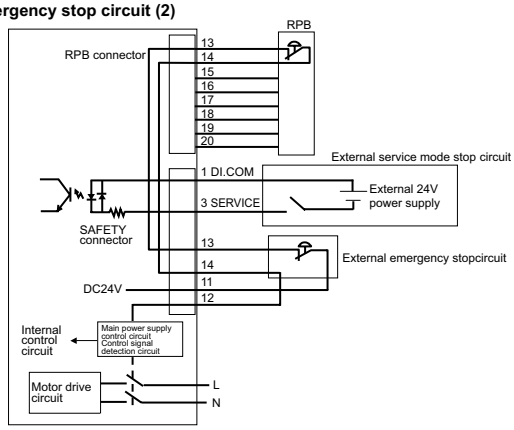


Emergency input signal connections

●Connection when using the standard RPB with an external emergency stop circuit (1)



●Connection when using the standard RPB with an external emergency stop circuit (2)



SAFETY connector signals

Terminal number	I/O No.	Name
1	DI.COM	Dedicated input common
2	INTERLOCK	Interlock signal
3	SERVICE	SERVICE mode input
4	DO.COM	Dedicated output common
5	MPRDY	Main power supply ready
6	SERVO OUT	Servo-on state output
7	NC	No connection
8	KEY1	RPB key switch contact
9	KEY2	RPB key switch contact
10	24VGND	EMG 24V, GND
11	EMG24V	Power supply for emergency stop input
12	EMGRDY	Emergency stop ready signal
13	EMGIN1	Emergency stop input 1
14	EMGIN2	Emergency stop input 2
15	EMGIN3	Emergency stop input 3
16	EMGIN4	Emergency stop input 4
17	LCKIN1	Enable switch input 1
18	LCKIN2	Enable switch input 2
19	LCKIN3	Enable switch input 3
20	LCKIN4	Enable switch input 4

RCX221/RCX222

Standard I/O [connector name: STD. DIO] signal table

Terminal number	Signal name	Name	
		RCX221	RCX222
1	DI01	Servo ON	
2	DI10	Sequence program control	
3	DI03	Step run	
4	CHK1	Check input 1	
5	DI05	I/O command run	
6	DI06	Spare Note 1	
7	DI07	Spare Note 1	
8	DI20	General input 20	
9	DI21	General input 21	
10	DI22	General input 22	
11	DI23	General input 23	
12	DI24	General input 24	
13	DI25	General input 25	
14	DI26	General input 26	
15	DI27	General input 27	
16	DO00	EMG monitor (emergency stop monitor)	
17	DO01	CPU OK	
18	DO10	AUTO mode	
19	DO11	Return-to-origin complete	
20	DO12	Sequence program in progress	
21	DO13	Auto operation in progress	
22	DO14	Program reset output	
23	DO15	Battery alarm output Note 2	
24	DO16	END	
25	DO17	BUSY	
26	DI12	Auto operation start	
27	DI13	AUTO mode switching	
28	DI14	ABS reset (Not in use normally)	Return-to-origin Note 3
29	DI15	Program reset	
30	DI16	MANUAL mode	
31	DI17	Return-to-origin (In use normally)	ABS reset Note 4
32	DI30	General input 30	
33	DI31	General input 31	
34	DI32	General input 32	
35	DI33	General input 33	
36	DI34	General input 34	
37	DI35	General input 35	
38	DI36	General input 36	
39	DI37	General input 37	
40	CHK2	Check input 2	
41	DO02	Servo-on state	
42	DO03	Alarm	
43	DO20	General output 20	
44	DO21	General output 21	
45	DO22	General output 22	
46	DO23	General output 23	
47	DO24	General output 24	
48	DO25	General output 25	
49	DO26	General output 26	
50	DO27	General output 27	

Note 1. Use of DI06, DI07 is prohibited.
Note 2. DO15 is a memory backup battery voltage drop alarm output.
Note 3. Set origin return for axes using incremental specifications and axes using semi-absolute specifications.
Note 4. Set origin return on axes using absolute specifications.

Area check output can be assigned to DO20 to DO157.
(Area check output assignment differs depending on the controller software version. See the user's manual for details.)

Option I/O [connector name: OP. DIO] signal table

Terminal number	Signal name	Name
1	–	Spare
2	DI40	General input
3	–	Spare
4	DI41	General input
5	–	Spare
6	–	Spare
7	–	Spare
8	DI50	General input
9	DI51	General input
10	DI52	General input
11	DI53	General input
12	DI54	General input
13	DI55	General input
14	DI56	General input
15	DI57	General input
16	–	Spare
17	–	Spare
18	DO30	General output
19	DO31	General output
20	DO32	General output
21	DO33	General output
22	DO34	General output
23	DO35	General output
24	DO36	General output
25	DO37	General output
26	DI42	General input
27	DI43	General input
28	DI44	General input
29	DI45	General input
30	DI46	General input
31	DI47	General input
32	DI60	General input
33	DI61	General input
34	DI62	General input
35	DI63	General input
36	DI64	General input
37	DI65	General input
38	DI66	General input
39	DI67	General input
40	–	Spare
41	–	Spare
42	–	Spare
43	DO40	General output
44	DO41	General output
45	DO42	General output
46	DO43	General output
47	DO44	General output
48	DO45	General output
49	DO46	General output
50	DO47	General output

Robot Language Table

General commands

Language	Function
DECLARE	Declares that a label or sub-procedure is in an external program.
DEF FN	Defines a function that is available to the user.
DIM	Declares the name of an array variable and the number of elements.
EXIT FOR	Terminates a FOR statement to NEXT statement loop.
FOR to NEXT	Controls repetitive operations
GOSUB to RETURN	Jumps to a subroutine with the label specified by a GOSUB statement and executes the subroutine.
GOTO	Unconditionally jumps to the line specified by a label.
HALT	Stops a program and resets it.
HOLD	Pauses a program.
IF	Allows control flow to branch according to conditions.
LET	Executes a specified assignment statement.
ON to GOSU	Jumps to a subroutine with each label specified by a GOSUB statement according to conditions and executes the subroutine.
ON to GOTO	Jumps to each line specified by a label according to conditions.
REM	All characters that follow REM or an apostrophe (') are viewed as comments.
SELECT CASE to END SELECT	Allows control flow to branch according to conditions.
SWI	Switches the currently executed program to a specified program, and executes from the first line after compiling.
WHILE to WEND	Controls repetitive operations.
Label statement	Defines "labels" in program lines.

Robot operation

Language	Function
ABSRST	Performs return-to-origin along robot absolute motor axes.
DRIVE	Performs an absolute movement of each axis in the main group.
DRIVEI	Performs a relative movement of each axis in the main group.
MOVE	Performs an absolute movement of the main robot axes.
MOVEI	Performs a relative movement of the main robot axes.
ORIGIN	Performs return-to-origin on an incremental mode axis or absolute search on a semi-absolute mode axis.
PMOVE	Performs a pallet movement of the main robot axes.
SERVO	Controls the servo ON/OFF of the specified axes in the main group or all axes (in main group and sub group).

I/O control

Language	Function
DELAY	Waits for the specified length of time (ms).
DO	Outputs the specified value to the DO ports.
LO	Outputs the specified value to the LO port to prohibit axis movement or permit axis movement.
MO	Outputs the specified value to the MO ports.
OUT	Turns ON the bits of the specified output ports and the command statement ends.
RESET	Turns OFF the bits of the specified output ports.
SET	Turns ON the bits of the specified output ports
SO	Outputs the specified value to the SO port.
TO	Outputs the specified value to the TO port.
WAIT	1. Waits until the condition in DI/DO conditional expression are met. 2. Waits until positioning on the robot axes is complete (within the tolerance range).

Coordinate control

Language	Function
CHANGE	Switches the hand of the main robot.
HAND	Defines the hand of the main robot.
RIGHTY / LEFTY	Selects whether the main robot will be "right-handed" or "left-handed" when moving to a point specified on a Cartesian coordinate system.
SHIFT	Sets the shift coordinates for the main robot by using the shift data specified by a shift variable.

Condition change

Language	Function
ACCEL	Changes the acceleration coefficient parameter of the main group.
ARCH	Changes the arch position parameter of the main group.
ASPEED	Changes the automatic movement speed of the main group.
AXWGHT	Changes the axis tip weight parameter of the main group.
DECEL	Changes the deceleration rate parameter of the main group.
ORGORD	Sets the axis sequence parameter to perform return-to-origin and absolute search in the main group.
OUTPOS	Changes the OUT position parameter of the main group.
PDEF	Defines the pallet used to execute a pallet movement command.
SPEED	Changes the program speed for the main group.
TOLE	Changes the tolerance parameter of the main group.
WEIGHT	Changes the tip weight parameter of the main robot.

Communication control

Language	Function
ONLINE / OFFLINE	Changes communication mode and initialize the communication port.
SEND	Sends the read file data into a write file.

Screen control

Language	Function
PRINT	Displays the value of specified variable on the MPB/RPB screen.

Key control

Language	Function
INPUT	Assigns a value to the variable specified from the MPB/RPB.

Procedure

Language	Function
CALL	Calls up sub-procedures defined by the SUB and END SUB statements.
EXIT SUB	Terminates the sub-procedure defined by the SUB and END SUB statements.
SHARED	Does not permit variables declared with a program written outside a subprocedure (SUB to END SUB) to be passed on as dummy arguments, but allows them to be referred to with a sub-procedure.
SUB to END SUB	Defines a sub-procedure.

Task control

Language	Function
CHGPRI	Changes the priority of the specified task.
CUT	Terminates a task currently being executed or temporarily stopped.
EXIT TASK	Terminates its own task currently being executed.
RESTART	Restarts a task that is temporarily stopped.
START	Sets the task number and priority of the specified task and starts that task.
SUSPEND	Temporarily stops another task being executed.

Error control

Language	Function
ON ERROR GOTO	If an error occurs during program execution, this command allows the program to jump to the error processing routine specified by the label without stopping the program, or stops the program and displays the error message.
RESUME	Resumes the program execution after recovery from an error. This command is used in the error processing routine.
ERL	Gives the line number where an error occurred.
ERR	Gives the error code number when an error occurred.

PATH control

Language	Function
PATH	Sets the PATH motion on the main robot axis.
PATH END	Terminates the path setting for PATH motion.
PATH SET	Starts the path setting for PATH motion.
PATH START	Starts the PATH motion.

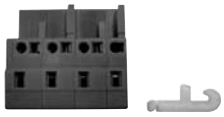
Torque control

Language	Function
DRIVE (with torque limit option)	Executes an absolute movement command on each axis in the main group.
TORQUE	Changes the maximum torque instruction for the specified main group axis.
TRQTIME	Sets the current limit time-out period on the specified main group axis when using a torque limit setting option in the DRIVE statement.
TRQTIME	Sets the current limit time-out period on the specified main group axis when using a torque limit setting option in the DRIVE statement.

Accessories and part options

Standard accessories

Power connector + wiring connection lever



Model	KAS-M5382-00

Note. Jointly used by SR1-P / SR1-X, RCX240.

Safety connector

Model	KAS-M5370-00

RPB terminator (dummy connector)

Attach this to the RPB connector during operation with the programming box RPB removed.

Model	KAS-M5163-30

Note. Jointly used by RCX240.

Standard I/O (STD.DIO) connector

Model	KAS-M533G-00

Option I/O (OP.DIO) connector

Model	KAS-M533G-10

L type stay (for installing front side, rear side.)

Use to install the controller.

Model	KAS-M410H-00

Note. Model No. is for a single bracket (L type stay). (Two are required to install one controller.)

Absolute battery (for RCX222 only)

Battery for absolute data back-up.

● Absolute battery basic specifications

Item	Absolute battery
Model	KAS-M53G0-11
Battery type	Lithium metallic battery
Battery capacity	3.6V/2,750mAh
Data holding time	About 1 year Note1 (in state with no power applied)
Dimensions	ϕ17 × L53mm
Weight Note2	22g

Note1. When using 2 batteries. Note2. Weight of battery itself.
Note. Jointly used by SR1-X, RCX240.

Note. The absolute battery is subject to wear and requires replacement. If trouble occurs with the memory then remaining battery life is low so replace the absolute battery. The battery replacement period depends on usage conditions. But generally you should replace the battery after about 1 year counting the total time after connecting to the controller and left without turning on the power.

Battery case

This is the absolute battery holder.

Model	KBG-M5395-00

Absolute battery installation conditions

1 to 2 batteries are required for each 2 axes.

- 1 battery…Data storage time of approximately 6 months (with no power applied)
- 2 batteries…Data storage time of approximately 1 year (with no power applied)

Note. Absolute battery is not required for either of the 2 axes if using incremental or semi-absolute specifications.

Options

Programming box RPB / RPB-E

This device can perform all operations such as manual robot operation, program entry and edit, teaching and parameter settings.

	RPB	RPB-E
Model	KBK-M5110-10	KBK-M5110-00
Enable switch	–	3-position
CE marking	Not supported	Applicable

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Support software for PC VIP+

VIP+ is a simple to use application software that makes tasks such as robot operation, writing-editing programs, and point teaching easy to visually understand.

VIP+ software model	KX0-M4966-00

● Environment

OS	Microsoft Windows 2000 / XP / Vista (32bit / 64Bit) / 7 (32bit / 64Bit)
CPU	Processor that meets or exceeds the suggested requirements for the OS being used.
Memory	Suggested amount of memory or more for the OS being used.
Hard disk	40MB of available space required on installation drive.
Communication method	RS-232C, Ethernet Note. For Ethernet communication, Ethernet unit for RCX series controller is required.
Applicable robot controllers	RCX221 / RCX222 / RCX141 / RCX142 / RCX240 / RCX240S

Note. Microsoft and Windows are registered trademarks of Microsoft Corporation.
Note. ADOBE and ADOBE READER are registered trademarks of Adobe Systems Incorporated.
Note. Ethernet is a registered trademark of Xerox Corporation.

Data cables

Communication cable for VIP+.
Select from USB cable or D-sub cable.

Model	USB type (5m)	KBG-M538F-00
	D-Sub type 9pin-9pin (5m)	KAS-M538F-10

Note. Data cable jointly used for POPCOM, POPCOM+, VIP, VIP+.
Note. USB driver for communication cable can also be downloaded from our website (driver supports VIP+, POPCOM, POPCOM+, and TS-Manager).

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Support software for PC

VIP+ Windows

Visual Integrated Programming

Applicable controllers ▶ RCX221 RCX222 RCX141 RCX142 RCX240 RCX240S

VIP+ is an easy to operate application software that makes tasks such as robot operation, writing-editing programs, and point teaching easy to visually understand.

Features

New support software VIP with improved ease of use

1 GUI updated for enhanced usability

The user interface has been improved with the VIP Windows function kept as it is so as to achieve more ease of use.

2 Data displayed in the tree view form

The data included in the controller is displayed legibly.

3 Fully equipped tool bar

Each of various functions can be executed by simple one click on the tool bar.

4 Expanded monitor function

The I/O conditions and variables in the controller can be monitored at real time. In the advanced mode, it is also possible to attach any label (Note) to general purpose input/output and others.

Note. The label is stored in PC.

5 Data operation using the new drag & drop function

The data can be stored easily by using the drag & drop function. Likewise, the stored data can be restored to the controller by operating the mouse only.

Select the data to be stored.

Drag the selected data to the document window and drop it there.

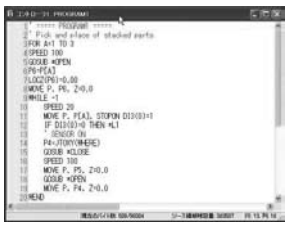
Specify the file name and this completes the storage procedure.

6 Input the data in the work sheet form (Parameter, Point data)

It is also possible to copy and paste the data from the other spread sheet (chart calculation software).

7 Syntax coloring when editing the program

When reserved words (character string reserved as the robot language) are inputted, they are colored automatically, making them noted at one glance for easier program editing.



8 Program execution monitor

The step being performed during the program execution can be monitored. Thus, it ispossible to check which step is performed without stopping the program, thereby debugging of the program is made much easier.

9 List appointing (point where the system is restored)

It is possible to create the system restoration point at any timing. By doing so at important points in the system constructing process when, for example, something faulty is found after the system was changed, the system can be returned to the state before such change easily.

VIP+

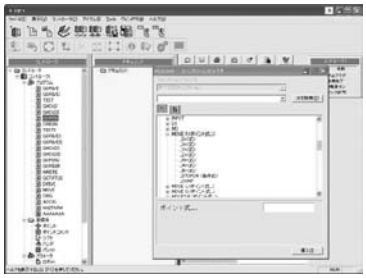
VIP PLUS function

1 Easy to use

With a number of robot operation items provided on one screen, any operator can operate easily without memorizing the menu construction.

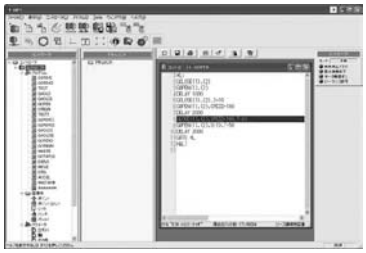
2 Programming editing

The program, point, parameter, shift, and hand can be edited on the PC alone. Equipped with the function selector having the command searching function which enables to input the robot language with ease.



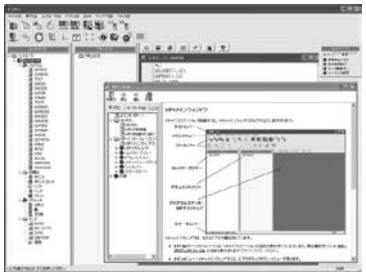
3 Data check function

Provided with the equivalent data check function to that of a robot controller, it is possible to correct data errors before operation.



4 Help function

When more information is needed during operation, press the [F1] or [HELP] key, and the help screen will appear.

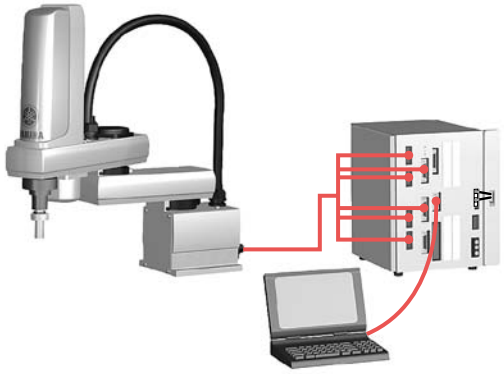


5 Robot operation

By connecting PC and controller with communication cable, robot operation will be available by the on-line command.

6 On-line editing

Connecting a PC and the controller with a communication cable enable to edit data from robot controllers just as with RPB / RPB-E.

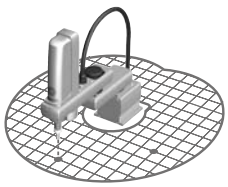


7 Creating point data

There are three methods available for creating the point data.

MDI (Manual Data Input) teaching

The numeric keyboard is used to enter position coordinate data directly.



Remote teaching

The robot arm is actually moved to the target position using the keys for point data registration.

Direct teaching

The robot arm is manually moved to the target position with the servo motors off for point data registration.

Environment / Ordering method ▶ P.491

Support software for PC VIP+

Model	KX0-M4966-00

Environment

OS	Microsoft Windows 2000 / XP / Vista (32bit / 64Bit) / 7 (32bit / 64Bit)
CPU	Processor that meets or exceeds the suggested requirements for the OS being used.
Memory	Suggested amount of memory or more for the OS being used.
Hard disk	40MB of available space required on installation drive.
Communication method	RS-232C, Ethernet Note. For Ethernet communication, Ethernet unit for RCX series controller is required.
Applicable robot controllers	RCX221 / RCX222 / RCX141 / RCX142 / RCX240 / RCX240S

Note. Microsoft and Windows are registered trademarks of Microsoft Corporation.
Note. ADOBE and ADOBE READER are registered trademarks of Adobe Systems Incorporated.
Note. Ethernet is a registered trademark of Xerox Corporation.

Data cables (5m)

Communication cable for VIP+.
Select from USB cable or D-sub cable.

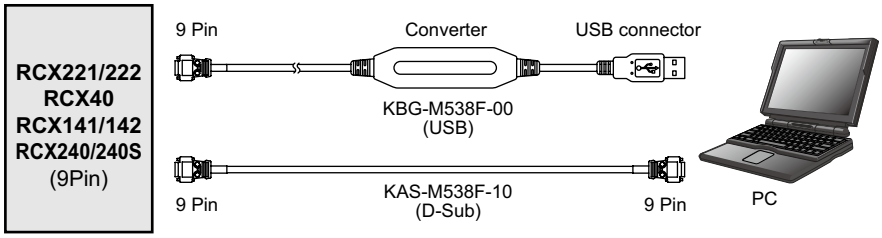
USB

D-Sub

Model	USB type (5m)	KBG-M538F-00
	D-Sub type 9pin-9pin (5m)	KAS-M538F-10

Note. Data cable jointly used for POPCOM, POPCOM+, VIP, VIP+.
Note. USB driver for communication cable can also be downloaded from our website (driver supports VIP+, POPCOM, and TS-Manager).

Controller and data cable connection diagrams



Programming box

RPB/RPB-E

Applicable controllers ▶ RCX221 RCX222 RCX240 RCX240S

Customers using the RCX141 / RCX142 controllers should use the connector converter cable (See P.519.)

All operations can be performed from this device including manual robot operation, programming entry and editing, teaching and setting parameters. The display works interactively with the operator so even an absolute beginner can easily learn how to use programming box.

RPB / RPB-E basic specifications

Name	RPB	RPB-E
External view		
Applicable controllers	RCX221 / RCX222 / RCX240 / RCX240S	
Model	KBK-M5110-10	KBK-M5110-00
Display	LCD (40characters 8 lines)	
Emergency stop button	Normally closed contact point (with lock function)	
Enable switch	–	3-position
CE marking	Not supported	Applicable
Operating temperature	0°C to 40°C	
Operating humidity	35% to 85%RH (non-condensing)	
Dimensions	W180 × H250 × D50mm (Strap holder, emergency stop button not included.)	
Weight	600g	
Cable length	5m (Standard), 12m (Options)	

Part names and function

Display (screen)
Liquid crystal display (LCD) shows different types of information with 8 lines × 40 characters. Contrast is adjustable.

Sheet keys
These are key switches for operating the robot or entering programs, etc. These are broadly grouped into 3 blocks consisting of function keys, control keys, and data keys.

Emergency stop button
Pressing this button during robot operation sets the robot to emergency stop. These are B contact type switches.

RPB connector
This is a connector for connecting the RPB to the controller.

RPB-E Rear side

3-position enable switch (only on RPB-E)
This switch is usable as part of an external (remote) safety circuit.
Pressing this switch inwards or releasing it cuts off the (RPB/robot) circuit. However that circuit is operable when this switch is in middle position.
This enable switch is usually operable in service mode. It functions as part of an external safety circuit so that releasing the enable switch or pressing it inwards set the robot to emergency stop.

Field network system with minimal wiring

NETWORK

Applicable controllers ▶ RCX221 RCX222 RCX240 RCX240S

CC-Link

- Option unit with networking functions that can be incorporated in YAMAHA robot controllers, RCX221 / RCX222 / RCX240 / RCX240S.
- As connection of the robot system and the sequencer requires only one (4-wire) dedicated cable, it is possible to save wiring of the entire system, which contributes to efficient wiring work, reduction of installation and maintenance costs, etc.
- 96 general use inputs/outputs, 16 dedicated inputs/outputs (4 nodes occupied).
- Capable of simulating serial operation of parallel I/O. With this function set properly, it is possible to control various I/O units connected to the parallel I/O of the robot controller, such as sensor and relay from the sequencer side without using the robot program, as if they are I/Os of the CC-Link system.

Basic specifications for network modules CC-Link

Item	Network modules CC-Link
Applicable controllers	RCX221 / RCX222 / RCX240 / RCX240S
Version supporting CC-Link	Ver. 1.10
Remote station type	Remote device node
Number of occupied stations	Fixed to 4 stations
Station number setting	1 to 61 (set from the Rotary swich on board)
Communication speed setting	10Mbps, 5Mbps, 2.5Mbps, 625Kbps, 156Kbps (set from the Rotary swich on board)
No. of CC-Link I/O Note1	General input 96 points, General output 96 points, Dedicated input 16 points, Dedicated output16 points
Parallel external I/O Note2	A function that simulates serial communication enables individual control of the various points from a master sequencer, regardless of the robot program.
Shortest distance between nodes Note3	0.2 m or more
Overall length Note3	100m/10Mbps, 150m/5Mbps, 200m/2.5Mbps, 600m/625Kbps, 1200m/156Kbps
Monitor LED	RUN, ERR, SD, RD

Note 1. Controller I/Os are updated every 10ms.
Note 2. With RCX 141/142, the exclusive input of the parallel I/O cannot be used other than the interlock input.With RCX221 / 222, the exclusive input of the parallel I/O cannot be used. (The interlock input terminal is located on the SAFETY connector side.)
Note 3. These values apply when a cable that supports CC-Link Ver.1.10 is used.

DeviceNet™

- Option unit with networking functions that can be incorporated in YAMAHA robot controllers, RCX221 / RCX222 / RCX240 / RCX240S.
- As connection of the robot system and the sequencer requires only one (5-wire) dedicated cable, it is possible to reduce wiring of the entire system, which contributes to efficient wiring work, reduction of installation and maintenance costs, etc.
- Capable of simulating serial operation of parallel I/O. With this function set properly, it is possible to control various I/O units connected to the parallel I/O of the robot controller, such as sensor and relay from the sequencer side without using the robot program, as if they are I/Os of the DeviceNet™ system.

Basic specifications for network modules DeviceNet™

Item		Network modules DeviceNet™
Applicable controllers		RCX221 / RCX222 / RCX240 / RCX240S
Applicable DeviceNet™ specifications		Volume 1 Release2.0 / Volume 2 Release2.0
Device Profile Name		Generic Device (device number 0)
Number of occupied CH Note1		Normal: Input/output 24ch each, Compact: Input/output 2ch each
MAC ID setting		0 to 63
Transmission speed setting		500Kbps, 250Kbps, 125Kbps (set using DIP switch on board)
DeviceNet™ I/O Note2	Normal	General input 96 points, General output 96 points, Dedicated input 16 points, Dedicated output 16 points
	Compact	General input 16 points, General output 16 points, Dedicated input 16 points, Dedicated output 16 points
Parallel external I/O Note3		The master module and up to four ports can be controlled regardless of the robot program by using the pseudoserialization function.
Network length	Overall length Note4	100m/500Kbps, 250m/250Kbps, 500m/125Kbps
	Branch length / Overall branch length	6m max./39m max., 6m max./78m max., 6m max./156m max.
Monitor LED		MS (Module Status), NS (Network Status)

Note1. Use the robot parameter to select Normal or Compact. However, with the controllers earlier than Ver.9.08 of RCX221 / 222, this selection is not available and the setting remains the same as Normal.
Note2. Controller I/Os are updated every 10ms.
Note3. With RCX221 / 222, the exclusive input of the parallel I/O cannot be used. (The interlock input terminal is located on the SAFETY connector side.)
Note4. These values apply when a thick cable is used. The distance is less when a fine cable is used or when thick and fine cables are mixed in use.

PROFIBUS

- Option unit used to connect a YAMAHA robot controllers RCX221 / RCX222 / RCX240 / RCX240S to PROFIBUS.
- Optimum for high speed data communication and complicated communication processing.
- Communication is made available among devices of multiple number of manufacturers.
- Capable of simulating serial operation of parallel I/O. With this function set properly, it is possible to control various I/O units connected to the parallel I/O of the robot controller, such as sensor and relay from the sequencer side without using the robot program, as if they are I/Os of the PROFIBUS system.

Basic specifications for network modules PROFIBUS

Item	Network modules PROFIBUS
Applicable controllers	RCX221 / RCX222 / RCX240 / RCX240S
Communication profile	PROFIBUS-DP slave
Number of occupied nodes	1 node
Setting of station address	1 to 99 (set using Rotary switch on board)
Setting of communication speed	9.6Kbps, 19.2Kbps, 93.75Kbps, 187.5Kbps, 500Kbps, 1.5Mbps, 3Mbps, 6Mbps, 12Mbps (automatic recognition)
PROFIBUS I/O Note1	General input 96 points, General output 96 points, Dedicated intput 16 points, Dedicated output 16 points
Parallel external I/O Note2	The master module and up to four ports can be controlled regardless of the robot program by using the pseudoserialization function.
Overall length	100m/3M·6M·12Mbps, 200m/1.5Mbps, 400m/500Kbps, 1000m/187.5Kbps, 1200m/9.6K·19.2K·93.75Kbps
Monitor LED	RUN, ERR, SD, RD, DATA-EX

Note 1. The shortest I/O update interval of the controller is 10ms but the actual I/O update time varies depending on the update time with the master station.
Note 2. With RCX221 / 222, the exclusive input of the parallel I/O cannot be used. (The interlock input terminal is located on the SAFETY connector side.)

Ethernet

- Option unit used to connect a YAMAHA robot controller to Ethernet, which can be incorporated in YAMAHA robot controllers, RCX221 / RCX222 / RCX240 / RCX240S. Connection of this unit to the network operation by the TCP/IP protocol with a 10BASE-T cable makes data exchange with a robots easy.
- Capable of making an easy access from the TELNET terminal to the robot controller. As the command system is the same as that by the RS-232C communication, even first-time users can use it easily. (Windows PCs have a built-in TELNET terminal called TELNET.EXE as a standard equipment.)
- With a number of controllers connected in the network, it is possible to perform integrated information control over robots even at a distance from the work site.

Basic specifications for network modules Ethernet

Item	Network modules Ethernet
Applicable controllers	RCX221 / RCX222 / RCX240 / RCX240S
Network specification	As specified for Ethernet (IEEE802.3)
Connector specification	RJ-45 connector (8-pole modular connector) 1 port
Baud rate	10Mbps (10BASE-T)
Communication mode	Half Duplex (Half-duplex)
Network protocol	Application layer: TELNET / Transport layer: TCP / IP Network layer: IP, ICMP, ARP / Data link layer: CSMA/CD / Physical layer: 10BASE-T
Number of simultaneous log inputs	1
Setting of IP address, etc.	Set from RPB
Monitor LED	Run, Collision, Link, Transmit, Receive